the angles, formed by the joined sections, to be increased or decreased, so that a section of a side, and a corresponding roof section, may be added to or taken from, the building without impairing its efficiency or affecting the strength of the fastenings.

Curved weather strips are applied to the outer portion of the angles, their shape permitting their adjustment to the angles in altering the size of the building, while they completely exclude the wind and rain, and also operate in connection with peculiar shaped bolts, which fasten them to the building, as binders, to strengthen and support the structure. The roof sections may be carried to a point, or a cone of sheet metal may be fitted at the summit, as shown.

The cone may be used as a ventilator or flue, in which case it should be made with a circular shaft, in order to more readily fit the roof sections to it, their points being cut properly for this purpose.

The building may be set upon any kind of ordinary foundation. To secure it at the bottom, if thought necessary, a sill or rail can be used.

The roof can be covered, if desired, by canvas or other material, but the inventor prefers to strip the joints with tarred or painted canvas.

The advantages of this kind of building are cheapness, portability (the pieces being light and few), the ease and facility with which such houses can be put together or taken down, and the capability of enlargement or diminution, nothing being needed but duplicate sections to enlarge as much as desired.

Patented August 8, 1871, by Francis M. Bain, of Delaware, Ohio, who may be addressed for further information.

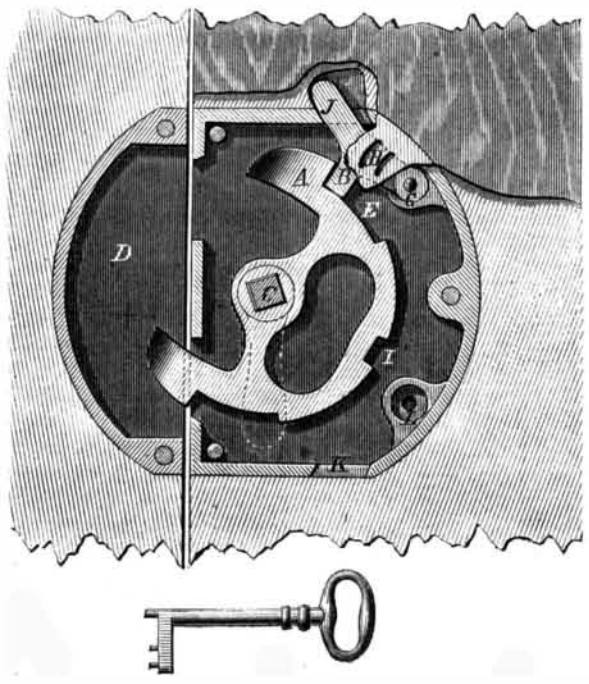
WARNER AND PAYNE'S DOOR LOCK.

This is a very simple lock, the bolt of which may be used either as a latch bolt, or as a lock bolt to securely fasten the door to which it is applied.

Besides the case, it consists of only two working parts, namely, the bolt, A, and the pawl, B, and the pivots on which they turn, all of which are cheaply made.

The bolt, A, which is in form something more than a semicircle, turning freely on its spindle, C, drops by its own gravity into the position shown in the engraving, and enters the keeper, D. In this position it may be turned by the knobs or handles on the spindle to a distance limited by the length of the notch, E, in which the pawl, B—also acting by gravity—enters, and with the shoulders of which notch the pawl engages.

This motion, however, is sufficient to release the bolt from the keeper, so that the knobs only are required to move the former when used in the manner described.



The pawl, b, turns upon a hollow pivot or cylinder, G, the opening in which coincides with a hole in the case of the lock. From the center of this opening, two segmental apertures, H, are cut through the case. The pod of the key enters the hollow pivot of the pawl, and the two wards enter holes in the pawl reached through the segmental openings, H. By turning the key thus applied, the pawl is raised, so that the bolt may be turned further round by the knobs on the spindle, and the pawl may enter the notch, I, the latter being made to fit, quite closely, the downward projection on the pawl. In this position, the bolt cannot be turned from the outside without the use of the key. The pawl, however, has a handle, J, from which projects a knob on the inside of the door, by the use of which the pawl may be raised and the bolt turned without the key. By making the bolt similar at both extremities and providing a second opening, K, for the handle of the pawl, and a proper pivot hole, L, for the pivot of the pawl, the lock is made reversible for right and left hand doors.

Patented through the Scientific American Patent Agency, Oct. 3, 1871, by Martin P. Warner and Edwin W. Payne, of Morrison, Ill.

Novel Uses of Electricity.

The efforts which have been made from time to time, with but poor encouragement, to engrave on metals by means of electricity, seem at last, says the *Iron Age*, to have resulted in the attainment of practical results. An ingenious French mechanic has produced an invention by which a metal plate, upon which a design is drawn with a chemical ink of some kind is slowly rotated with its face vertical, and several other similar plates, graded in size, are also slowly rotated by appropriate mechanism. The object of the invention is to engrave on the smaller plates the design traced upon the largest, on different scales of magnitude, which is accomplished by applying a cutting point to the face of each plate, and which is pressed against it by means of an electric current whenever a blunt point, applied to the large plate, encounters the ink in which the design is traced—the cutting points being at other times withdrawn. The point presented to the first plate is merely a "feeler," which determines by electrical agency whether the ink is beneath it or not. If it is, the points are pressed into the surface of the other plates; if not, they are withdrawn and prevented from cutting. The feeler and the brluns must, of course, all follow a spiral track. This is crude, and can be made applicable to the reproduction of certain kinds of designs only, but it is considered a long step in the direction of practical success.

Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

The Psychic Force.

To the Editor of the Scientific American:

An anonymous writer from Jersey City, signing himself B. D., remarks in your last number, that the unearthing of the jugglery which I maintain to underly the manifestations exhibited by Home, requires "far deeper plowing than Dr. Vander Weyde has done in his letter of August 12."

I say so myself; but how can B. D. expect that I would be able thoroughly to unearth tricks which not only I had no opportunities to investigate, but which I have even not seen, and of which I know nothing except by description, in which, no doubt, many most important details were left out, and only such particulars were mentioned as served to apologize for the apparent credulity of the reporter, Mr. Crookes? His whole report is evidently one sided. He overlooked little particulars, which would, to a more competent expert than he proves himself to be, have given the key to the mystery of the whole performance.

When, some years ago, the Emperor Napoleon III. had seen Home's exhibition, he was full of astonishment at the wonderful feats he had witnessed, and invited, the next day, the eminent savant Arago to the Tuileries; and, after giving him a detailed statement of the performances, asked an explanation on scientific principles. "Sire," said Arago, "it is utterly impossible for me to give a satisfactory explanation of phenomena which I have not seen myself." I think this is an excellent rule, and I have since followed this example, and do not pretend to give a satisfactory explanation. All that I did, and intended to do, was to suggest some ideas explaining how such tricks might be done, and to call attention to the infinite resources offered to the initiated in the field of physical sciences.

B. D. makes one strong point out of the fact that Mr. Crookes saw Mr. Home change his dress, and therefore knows that there was no machinery secreted about him. Well, this only proves that the tricks were performed by means of contrivances not concealed on Mr. Home's body; or, after all, perhaps there may have been some machinery concealed in the clothes he put on—a trick of which I myself have been guilty. Mr. Crookes, it appears, was not enough of an expert to examine carefully every article of dress put on by Home, otherwise he would surely have mentioned this also.

Another strong point made by B. D. is the statement that the apparatus was arranged without Home's supervision. I ask, therefore: Who arranged it? Evidently, Mr. Crookes did not do it alone; his assistant, who looked under the table during the performance, says he saw certain motions of the accordion, and Mr. Crookes inserts in his testimony the existence of these motions, which he did not see at all himself. This has no value, it is not even legal testimony, as before a court you may not swear as to facts you know only by hearsay. I have my strong suspicions that there was collusion between Home and Mr. Crookes' assistant; this is another trick of which I myself confess again to have been guilty often: but Mr. Crookes is too confiding and too innocent to cherish any such suspicions.

B. D. thinks I am "attributing to Mr. Crookes, and the two other gentlemen, an amount of obtuseness that is not characteristic of either of them." B. D. must profess little knowledge of human character not to know, or never to have observed, that many men, very intelligent and of sound judgment in almost all respects, are obtuse, and even stupid, in certain peculiar matters—for instance, in their religious tenets, or in their political convictions. It has even been asserted that most men are insane on some particular subject, and it is surely true of a great many I know; they rather believe in a mysterious supernatural agency, acting in an absurd, nonsensical manner, than in the well known natural laws and forces, acting always consistently and wisely, and of which those who are more acute than their fellow men take advantage to deceive them.

Certain men will profit by the general love for the mysterious, by the universal predilection for believing in what is liked best, without investigating what is strictly true, and by the general disgust of people in being told that they err in judgment. This last fact is the strong point which maintains the belief in supernatural agencies. Men, in general, are not ashamed to complain of their bodily defective constitution, and even their mental deficiences in regard to memory, etc., but never in regard to their judgment; this is infallible, in their own sight. Therefore, when you tell them that they erred in judging about the so called spiritual manifestations, and that they were totally mistaken in ascribing them to the mysterious agencies, the belief in which they so dearly cherish, you will find that there are very few who will ever forgive you.

I will only add, as a proof for the necessity of witnessing such performances in order to explain them, that I was at a total loss to explain the feats performed by the Davenport brothers, as long as I only had heard of them by report; but as soon as I saw their performance, at the Cooper Institute in 1864, it was not only all clear to me, but I performed myself all their feats, before many witnesses, when no public performances were taking place. As at that time I lived in the Cooper Institute building, I had access to the hall in which their box or closet remained, and in which they performed every evening. I had, therefore, for some two weeks, a good chance to practice, and soon became as expert in all their feats as the genuine original performers themselves, and must declare that I since have remained utterly astonished at the obtuseness of the audiences which nightly paid their money, and believed in supernatural agencies to account for so clumsy and stupid deceptions. The only way by which I can account at all for this fact, is the consideration that the very great majority of those who came there, are prejudiced in favor of the reality of supernatural agencies; they expect and they wish to see them, and therefore get what they wish. Luther gave proof of his deep knowledge of human nature when he said: "Just as you want your mental belief, so you will get it."

P. H. VANDER WEYDE.

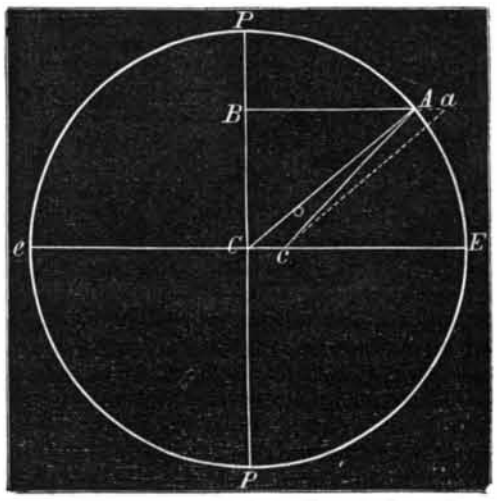
New York, Sept. 27, 1871.

Variation of a Plumb Line from the Perpendicular.

To the Editor of the Scientific American:

In looking over a file of the SCIENTIFIC AMERICAN, I find in your issue of January 14, 1871, a discussion relative to the tendency of a plumb line to vary from the true perpendicular, as is found to exist at the central shaft of the Hoosac tunnel. A mathematical demonstration by J. E. Hendricks, of Des Moines, Iowa, is there given, which I think can be shown to be incorrect both in principle and in the result.

Let P, E, P, e, be the earth; P, P, the axis; E, e, the equator. As the earth revolves upon its axis, every place on its surface, except at the two poles, describes a circle; thus a body, placed at A, will, in one revolution of the earth, describe a circle, the semidiameter of which will be A, B, perpendicular to the axis, P, P. In like manner; C, E, is the semidiameter of the circle described by the revolution of a place at the equator. But C, E, is the semidiameter of the earth, and A, B, the cosine of the latitude of the place, A. By the "Laws of Central Forces," when the periodic times of a revolution are equal, the centrifugal forces are as the radii. Whence a body at E has its centrifugal force as much greater than at A as the radius C, E, is greater than the radius A, B. Consequently we have this universal rule: The centrifugal force



at the equator, is to the centrifugal force at any other place, as the radius is to the cosine of the latitude of the place.

With the foregoing explanation, we come direct to the question at issue. Required the point toward which a falling body will tend, at the mouth of the central shaft of the Hoosac tunnel in 42° N. Lat., the centrifugal force at the equator being to the force of gravity as 1 is to 289. 1. As radius: to the cosine of 42° :: is 1, (the centrifugal force at the equator): the centrifugal force at 42° N. Lat. = 0·74314.

Hence the force of gravity at that point is to the centrifugal force in the ratio of 289 to 0·74314. To construct the problem geometrically, draw the dotted line, A, a, (representing the centrifugal force and its direction), so that it shall have a proportionate length to line A, C, (representing the force of gravity and its direction), as 0·74314 is to 289; draw the line, a, c, parallel to A, C, and c will be the point to which the falling body will tend, along the diagonal, A, c. c will be a point on a semidiameter at the equator, drawn parallel to a tangent at the equator, where it is intersected by a meridian of the place of experiment. 2. To find the angle of variation from a true perpendicular: The line, A, a, equals C, c, the angle A, C, c, equals the latitude of the place of experiment, 42°, therefore, as the logarithm of 289 is to the logarithm of 0·74314, so is the sine of 42° to the angle required, which = 5′,55·095″

To find the amount of deflection at the bottom of the shaft it being 1,030 feet deep. As radius is to the sine of 5′,55·095″, so is the logarithm of 1,030 to the distance, which = 1·7722 feet in the direction of the centrifugal force.

The foregoing demonstration is based on the supposition that the earth is a sphere, and the place of experiment at the